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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,658	02/07/2002	Tomoyuki Furuhashi	9319S-000328	3300
27572	7590	09/30/2004		
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303				
			EXAMINER PIZARRO CRESPO, MARCOS D	
			ART UNIT 2814	PAPER NUMBER

DATE MAILED: 09/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/072,658

Applicant(s)

FURUHATA ET AL.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-11 and 22-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-11 and 22-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 August 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>18</u> . | 6) <input type="checkbox"/> Other: _____ |

Application/Control Number: 10/072,658 (Final Rejection)
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Attorney's Docket Number: 9319S-000328

Filing Date: 2/7/2002

Claimed Foreign Priority Date: 1/30/2002 (JP 2002-21025)
2/8/2001 (JP 2001-32069)

Applicant(s): Furuhashi et al.

Examiner: Marcos D. Pizarro-Crespo

DETAILED ACTION

This Office action responds to the amendment in paper no. 19 filed on 8/12/2004.

Acknowledgment

1. The amendment in paper no. 19, filed on 8/12/2004, in response to the Office action in paper no. 17, mailed on 5/12/2004, has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 8-11 and 22-35.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters **42** (see, e.g., fig. 5) and **44** (see, e.g., pp.14II.3) have both been used to designate the same nitride-containing layer. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

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any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 26-33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6. Claims 26 and 30 recite that the first oxide film is free of boron and phosphorous. The description in the original disclosure fails to support this limitation in the claims. The specification (see, e.g., par. 0083-0086) describes several features of the first oxide film including that it may be formed using a reduced pressure CVD process using TEOS. The specification, however, fails to specify that, once formed, the first oxide film should be free of boron and phosphorous.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Initially, and with respect to claims 11 and 25, note that a "product by process" claim is directed to the product *per se*, no matter how actually made. See *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re*

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Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

Note that Applicant has burden of proof in such cases, as the above case law makes clear.

10. Claims 8, 11, 22, and 25, are rejected under 35 U.S.C. 103(a) as being unpatentable over Goda (US2001/002713) in view of Machida (US5376590).

11. Regarding claims 8 and 22, Goda (see, e.g., fig. 27) shows most aspects of the instant invention including a semiconductor device having a non-volatile memory transistor formed on a semiconductor layer **11**, the semiconductor device comprising:

- ✓ An interlayer dielectric layer provided over the semiconductor layer **11** and the transistor with the dielectric layer being in direct contact with a component of the transistor, the dielectric layer including
 - A layer **21** containing nitride
 - A second oxide film **17** provided on and in direct contact with the layer **21** containing nitride
- ✓ A wiring layer **18** provided on and in direct contact with the dielectric layer

Goda, however, fails to show a first oxide film provided as the lowermost layer of the dielectric layer such that the layer containing nitride is on and in direct contact with said first oxide film. Machida (see, e.g., col.16/ll.4-7), on the other hand, teaches that said first oxide film would protect Goda's device against contamination by mobile ions.

It would have been obvious at the time of the invention to one of ordinary skill in the art to provide a first oxide film as the lowermost layer of the dielectric layer in Goda's

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device, as suggested by Machida, to protect the device against contamination by mobile ions.

12. Regarding claims 11 and 25, Machida (see, e.g., col.15/ll.66) shows that the first oxide film is an oxide layer formed by CVD. The method of specifically forming the oxide film by reduced pressure CVD using TEOS, is an intermediate process step that does not affect the structure of the final device. See MPEP § 2113, which discusses the handling of "product by process" claims.

13. Claims 9, 10, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goda/Machida in view of Wu (US 6008517).

14. Regarding claims 9, 10, 23, and 24, Goda/Machida shows most aspects of the instant invention (see paragraph 8 above), except for the oxide film having a thickness of 30-70 nm.

In spite of Goda/Machida not showing that the oxide film has a thickness of 30-70 nm, since the applicants have not established the criticality (see next paragraph) of the film thickness and since these thicknesses are in common use in similar devices in the art (see, e.g., Wu/col.4/ll.16), it would have been obvious to one of ordinary skill in the art to use these values in the device of Goda/Machida.

CRITICALITY

15. The specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. Claims 26, 27, 29-31, and 33, are rejected under 35 U.S.C. 102(b) as being anticipated by Masashige (JP 10-154792).

18. Regarding claims 26 and 30, Masashige (see, e.g., figs. 5 and 6) shows all aspects of the instant invention including a semiconductor device having a non-volatile memory transistor formed on a semiconductor layer, the device comprising:

- ✓ An interlayer dielectric layer provided on the semiconductor layer and the transistor with the dielectric layer being in direct contact with a component of the transistor
- ✓ A wiring layer **24** provided on and in direct contact with the dielectric layer

Wherein the dielectric layer includes:

- ✓ A first oxide film **32**, free of boron and phosphorous, provided as the lowermost layer
- ✓ A layer containing nitride **33** provided on and in direct contact with the first oxide film **32**
- ✓ A second oxide film **34** provided on and in direct contact with the layer containing nitride **33**

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19. Regarding claims 27 and 31, Masashige shows the first oxide film having a thickness of 10 nm (see, *e.g.*, par. 0008).

20. Regarding claims 29 and 33, Masashige (see, *e.g.*, par. 0013) shows that the first oxide film is an oxide film formed by a reduced pressure CVD method using TEOS.

21. Claims 28, 32, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masashige in view of Park (US 5888910).

22. Regarding claims 28, 32, and 34, Masashige (see, *e.g.*, figs. 4 and 5) shows most aspects of the instant invention including a semiconductor device having a non-volatile memory transistor formed on a semiconductor layer, the device comprising:

- ✓ An interlayer dielectric layer provided over the semiconductor layer and the transistor
- ✓ A wiring layer **24** provided on and in direct contact with the dielectric layer

Wherein the dielectric layer comprises:

- ✓ A first oxide film **32** provided as the lowermost layer of the dielectric layer
- ✓ A layer containing nitride **33** provided on and in direct contact with the first oxide film **32**
- ✓ A second oxide film **34** provided on and in direct contact with the layer containing nitride **33**

Masashige, however, fails to show the first oxide film having a thickness of 30-70 nm. Park (see, *e.g.*, figs. 3 and 4), on the other hand, shows a first oxide film provided as the lowermost layer of an interlayer dielectric layer and having a thickness of 30-70

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nm to prevent impurities from penetrating into layers disposed underneath the film (see, e.g., col.3/ll.21-25).

It would have been obvious at the time of the invention to one of ordinary skill in the art to provide Masashige's first oxide film with a thickness of 30-70 nm, as shown by Park, to prevent impurities from penetrating into the layers underneath the film.

In addition, since the applicants have not established the criticality (see paragraph 15 above) of the thicknesses stated and since these thicknesses are in common use in similar devices in the art, as shown by Park, it would have been obvious to one of ordinary skill in the art to use these values in the device of Masashige.

23. Regarding claim 35, Masashige (see, e.g., par. 0013) and Park (see, e.g., col.3/ll.18-21) they both show that the first oxide film is an oxide film formed by a reduced pressure CVD method using TEOS.

Response to Arguments

24. The applicants argue:

Regarding the rejection of claims 8, 11, 22, and 25, Goda does not disclose nor suggest the necessity to protect the device against contamination by mobile ions. With the Goda reference being completely unconcerned about protecting the device against contamination from mobile ions, the teachings of Machida to use an oxide film to protect the device against contamination by mobile ions are irrelevant.

The examiner responds:

Machida teaches that using an oxide film as the lowermost layer of Goda's dielectric layer will protect Goda's device against contamination from mobile ions, in spite of the fact that Goda is silent with respect to protecting the device against such contamination. See, e.g., Machida/col.16/ll.4-10.

25. The applicants argue:

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Regarding the rejection of claims 9, 10, 23, and 24, the Wu reference may teach specific film thicknesses to be used in forming a non-volatile memory transistor, but it fails to disclose any type of films, or thicknesses thereof, to be used as films of an interlayer dielectric layer provided over a transistor. Since Wu is completely unconcerned with an interlayer dielectric layer, one skilled in the art would not look to Wu's oxide film thicknesses to form an interlayer dielectric layer over the transistor of Goda/Machida.

The examiner responds:

Although they both give different uses to their oxide films, Machida's lowermost film and Wu's dielectric layer are both oxide films. Wu teaches that oxide films having the claimed thickness of 30-70nm were in common use in the semiconductor art at the time of the invention and that absent any evidence to the contrary (e.g., evidence showing the critical nature of the claimed thickness) it would have been obvious to use these values in the device of Goda/Machida.

26. The examiner appreciates with respect the evidence submitted by the applicants to show the critical nature of the thickness of the lowermost oxide film. This thickness must be between 30-70 nm to be commensurate in scope with the evidence discussed in the amendment with respect to figure 17 of the specification. Claims 10, 24, 28, 32, and 34 clearly recite that the thickness of the lowermost oxide film is between 30-70 nm. However, according to the applicants (see, e.g., spec./par. 0124), the data in figure 17 corresponds to a silicon oxide layer formed by a reduced CVD method using TEOS. The claims fail to recite any limitation whatsoever about the manner in which the lowermost oxide film was formed. Accordingly, the evidence submitted is insufficient to rebut the *prima facie* case because experimental data limited to a silicon oxide layer formed by a reduced CVD method using TEOS is not commensurate in scope with the claims. *In re Grasselli*, 713 f.2d 731, 741, 218 USPQ 769, 777 (Fed. Cir. 1983). See also MPEP § 716.02(d).

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action with respect to claims 26-35. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

28. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

29. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(571) 272-1716** and between the hours of 9:30 AM to 8:00 PM (Eastern Standard Time) Monday through

Thursday or by e-mail via Marcos.Pizarro@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (571) 272-1705.

31. Any inquiry of a general nature or relating to the status of this application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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32. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/632-651,758-760	9/9/2004
Other Documentation: PLUS Analysis	6/5/2003
Electronic Database(s): EAST (USPAT, EPO, JPO, PGPub)	9/9/2004



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